excerpt from NLRT

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photographs are provided as Exhibit G. A more detailed description is provided in Section 3.01.

# 1.03 Site History

The Pedricktown secondary lead smelter was constructed in 1971-1972 to recycle automotive batteries and baghouse fines in the area illustrated on Figure 1. The smelter originally made use of a blast furnace and a reverberatory furnace for smelting. A sweater furnace was also on-site for melting of metallic lead scrap. The Pedricktown facility was upgraded to incorporate systems that would do the following:

- a. Take a tractor-trailer loaded with scrap batteries and dump the scrap batteries into an acid brick lined bin by inclining the tractor-trailer to a sixty degree angle on a hydraulic ramp.
  - b. Crush the batteries.
- c. Separate the plastic/rubber case materials, metallic lead, and lead compounds for recycling.
- d. Smelt lead-bearing materials (i.e. a rotary kiln) with minimal emissions of sulfur oxides.

A detailed drawing of the plant area showing major pieces of equipment and production areas is presented in Figure 2.

NL Industries, Inc. (NL) constructed a landfill on its Pedricktown facility's property. Figure 3 shows the location of the landfill, which consists of two phases - Landfill Phase A and Landfill Phase B. Landfill Phase A contains process wastes (blast furnace and kiln slag) from the facility, while Landfill Phase B also contains hard rubber case material and lead contaminated soils

that were excavated from the facility's grounds. The landfill was constructed with a double liner system which includes a primary membrane liner and a secondary asphaltic liner. The liner system includes leachate collection and withdrawal sumps. Each phase has a primary liner sump and a secondary liner sump. For this report, the terminology used will be A primary, B primary, A secondary, and B secondary. Exhibit A of the approved Work Plan (O'Brien & Gere, 1987) and Exhibit L provide additional detail on the landfill construction.

NL Industries, Inc. (NL) terminated lead smelting May 25, 1982. On October 6, 1982, NL signed an Administrative Consent Order (ACO) with the New Jersey Department of Environmental Protection (NJDEP) whereby NL agreed to undertake a variety of activities in order to address environmental conditions at the Site. In anticipation of the transfer of the property to National Smelting of New Jersey (NSNJ) the order was amended on February 10, 1983 to distribute the responsibilities for the various activities between NL and NSNJ.

Prior to the sale to NSNJ, NL washed all paved surfaces in the manufacturing area and cleaned soils around the plant by removing the soils to a depth of 12 inches (Exhibit G and Exhibit M). NL retained Geraghty & Miller, Inc. to design a ground water abatement system. The ground water abatement system was installed by Ground Water Technology/Moretrench America. The objective of the ground water abatement system is to prevent the off-site migration of contaminated ground water if remediation of the unconfined aguifer

is required. NL retained Roy F. Weston to design and oversee closure of the on-site RCRA Landfill in accordance with the Amended Order.

NSNJ purchased the smelter from NL and took possession of the Pedricktown property on February 24, 1983. NSNJ commenced rotary kiln smelting on May 20, 1983. NSNJ then operated the smelter until January 20, 1984. NSNJ's process attempted to recycle all types of lead-bearing materials as indicated by the materials remaining at the site when the site was abandoned by NSNJ. During the operation of their Pedricktown facility by NSNJ, NSNJ allowed slag waste from their processing of lead, along with other bulk, drummed and/or containerized waste materials and raw materials (including ore concentrates, fluxes and reagents) to accumulate in non-enclosed areas that were exposed to the elements. NSNJ filed for bankruptcy under Chapters 11 and 7 on March 5th and 27th, 1984 respectively.

Following bankruptcy filing, the National Bank of Georgia, (Trustee for the holders of New Jersey Economic Develop Authority Bonds issued to finance the operations of NSNJ) stationed personnel at the Site for site security and landfill maintenance. The National Bank of Georgia ceased landfill maintenance June 15, 1984, NL voluntarily entered the Site on June 18, 1984 to pump landfill leachate which had accumulated in the leachate sumps, and to maintain landfill cover materials. The National Bank of Georgia ceased security services August 31, 1985 and abandoned the Site.

#### SECTION 4 - NATURE AND EXTENT OF CONTAMINATION

This section presents an analysis of the data collected during the study and describes concentration levels found in the various environmental media in the study area. The spatial and temporal trends in concentration are discussed to provide assistance in evaluating the transport of the various contaminants.

#### 4.01 Sources

## Liquid Materials

The factory complex contained ponded stormwater on paved areas, trench drains, and basements. In addition, tanks and drums contained liquids within the fenced factory complex. The landfill includes four leachate sumps representing the two phases of the landfill and the primary and secondary liners as discussed in Section 1.03. Results of the laboratory analyses performed on the liquid materials from the factory complex are summarized on Table 2.

Three areas contain over 99% of the liquids in the factory complex. These areas are the ponded stormwater in the vicinity of the truck cut, the refining basements and the drainage trench in the center of the manufacturing area. These materials have identification numbers 122, 194, 196, 204 and 205 in Tables 1 and 2. Results from the analyses of these liquids demonstrate a mean lead concentration of 3.7 mg/ $\ell$  with a range from 1.62 mg/ $\ell$  to 6.95 mg/ $\ell$ . The geometric mean pH is 6.4 standard units (S.U.) with a range from 6.3 to 6.6 S.U. The mean Total Organic Carbon (TOC) was 7.4 mg/ $\ell$ .

Containerized liquids have a pH that ranges from 5.2 to 8.7. Total Organic Carbon ranges from <1 mg/ $\ell$  to 1720 mg/ $\ell$ . Total lead concentration ranges from 0.147 mg/ $\ell$  to 14.5 mg/ $\ell$ . Four samples were analyzed for Total Organic Halides (TOX) which range from <0.010 mg/ $\ell$  to 0.0325 mg/ $\ell$ . Four samples of containerized liquids were analyzed for gross alpha and gross beta radiologic parameters (Table 2). Gross alpha activities were less than detection limits. Gross beta activities ranged from below detection limits to 240  $\pm$  80 pCi/ $\ell$ .

## Solid Materials

The factory complex contains numerous solids associated with the secondary smelting of lead. Surface piles of rotary kiln slag and drosses are present. In addition, containers with lead-bearing feed materials, drosses, and wastes are located on-site. Analytical results of on-site solid materials are presented in Tables 3 and 4.

Table 3 shows that the on-site materials generally contain approximately 20% lead with a range from <1% to over 50%. The average lead concentration for the 39 samples tested was 24% (weight/weight) with a standard deviation of 17%. Only four samples had less than 5% lead by weight. Table 4 indicates that other metals such as arsenic, tin, antimony, cadmium, and zinc were present; however, lead typically represented over 90% of the metal present in the samples tested. Material identified as dross has a lead concentration which averaged 26% (w/w). Other elements present in varying amounts, up to 1% (w/w) were tin, zinc and/or

chromium. The color of the dross provided an indication of other metals present, for instance, yellow dross contained higher concentrations of tin.

Table 5 presents data from EP toxicity analyses performed on three composite slag samples and a duplicate. The results indicate that portions of the exposed slag generated by NSNJ are EP Toxic. Testing conducted by NL Industries on the rotary kiln slag during NL's operation (1980) demonstrated that the material was not EP Toxic (Exhibit H). NSNJ's operation was different from NL Industries, using different feed materials and operating conditions.

Since March of 1990, the USEPA has undertaken several response actions associated with the on-site solids and liquids (Exhibit K). Exhibit K indicates that the USEPA intends to remove the wastes "before the RI/FS is completed".

#### Leachate

Leachate samples were collected from each of the four leachate collection sumps< A primary, B primary, A secondary, B secondary. Results are presented in Table 6 with specific organic analytical results in Appendix K.

Results of the analysis performed on the leachate (Table 6) suggest that leachate from the A side primary sump of the landfill is a solution high in dissolved solids as evidenced by its tendency to crystallize at temperatures in the 50° to 60°F range. The high sodium concentration of 34,000 mg/t and pH 11.5 are consistent with the sodium carbonate used as part of the rotary kiln slag

production. The absence of lead in the leachate is likely due to the low solubility of lead carbonate (Stumm and Morgan, 1970). The presence of arsenic in the leachate at approximately 220 mg/t suggests that some waste within the fill contained arsenic which has been mobilized by the high pH leachate.

Results from the B side primary sump demonstrate much lower conductivity (13,500  $\mu$ mhos/cm), lower sodium (3,330 mg/ $\ell$ ), and higher lead (0.254 mg/ $\ell$ ). The lower pH may result in more mobility of lead. In addition, the arsenic concentration is much lower, suggesting that the waste containing the arsenic is not present in the B side or that the lower pH limits the mobility of arsenic.

Both phases of the landfill contain rotary kiln slag which is high in sodium and carbonates. Phase A of the landfill also contains process wastes from manufacturing activities which could explain the observed metal concentrations. The analytes examined in the leachate of Phase B occur at lower levels since hard rubber case material and soil excavated from the facility's grounds represent approximately 50% of the volume of Phase B (Figure 3).

The two secondary leachate collection sumps contain liquids. These liquids have a pH similar to that observed for the primary collection sumps. However, some parameters differ substantially between the primary and secondary leachate. Metal concentrations for aluminum, antimony, barium, chromium, and iron differed by an order of magnitude (10x) between the A primary and A secondary sumps. The B phase sumps also demonstrated order of magnitude (10x) differences in metal concentrations: aluminum, arsenic, cadmium, chromium, and lead.